INTERVIEWS WITH GREAT SCIENTISTS.

IV.—PROF. SCHRÖDINGER.

SCIENCE AS A GAME.

THE FUN OF FINDING THINGS OUT.

FUTILE INVENTIONS.

"WHO WANTS" HIGHER SPEEDS?

LIFE THE KEY TO THE UNIVERSE.

We publish below the fourth of a series of interviews by Mr. J. W. N. Sullivan with leading men of science in this country and abroad.

The interviewer's aim has been directed less to the scientific achievement of these thinkers than to the philosophic attitude to which their work has brought them.

Interviews with Sir A. S. Eddington (December 21), Mr. H. G. Wells (December 28), and Sir J. H. Jeans (January 4) have already appeared.

(By J. W. N. Sullivan.)

Professor Schrödinger, one of the most brilliant of the younger school of physicists, has won his reputation chiefly by his work on the theory of the atom. His work well exemplifies the tendency of modern physics to become so abstract as to be entirely non-picturable. Schrödinger himself regards this tendency as a passing phase. He thinks that the new theories will ultimately assume a picturable form, and that science will once more become "intelligible" to the layman.

"I took up mathematics and physics quite early, as part of my ordinary school course," said Professor Schrödinger. "I found that I liked these studies, and I conceived the project of going on to the technical high school in order to devote myself to the practical applications of science. But I found that I should have to learn geometrical drawing, and this prospect appalled me. So I went to the University instead, and concentrated on pure science. That really suited me much better, of course. But I must not give the impression that science alone interested me. As a matter of fact, my early desire was to be a poet. But I speedily realised that poetry was not a paying business. Science, on the other hand, offered me a career."

"A FORM OF PLAY."

"What do you find to be, now, your chief interest in science?"

"The aesthetic interest. But science does not merely consist in composing beautiful theories. That would be too easy. The fact that theories have to fit the external world means that the aesthetic criterion alone is not sufficient. Science, really, is a game played according to certain rules."

"What do you consider to be the chief importance of science to mankind?"

"Well, it so happens that I have just been writing about that very point. I have come to the conclusion that the chief function of science is to give

Features of To-day's "Observer."

SPECIAL ARTICLES AND INTERVIEWS: PAGE

Grave Outlook in Cotton Crisis. From Our Own Correspondent ... 15
India and the Round Table ... 17
Funeral of the Princess Royal ... 17
Interview with Prof. Schrodinger. By J. W. N. Sullivan ... 15
The League and Liberian Slave Trade 15
The Persian Exhibition. By J. V. S. Wilkinson ... 9
Effects of New Road Code. By John Prioleau ... 11
The Making of an Empire: 60 Years Ago at Versailles ... 11
Interview with Mr. Sinclair Lewis ... 10
President Hoover's Troubles. From Our Own Correspondent ... 16
Paris Week by Week. From Our Own Correspondent ... 10

BOOKS:

A Shakespeare Encyclopaedia. By J. C. Squire ... 4
Mongolia and Tibet. By Sir Percy Sykes ... 7
Milton in France. By Francis Birrell 8
African Adventures. By Stephen Gwynn ... 5
The Kaiser's Friend. By Ian F. Morrow ... 6
Fourrier in English. By A. F. Johnson ... 4
Mr. Chesterton in Rome. By Osbert Burdett ... 6
A Race of Dog-Lovers. By A. Croxton Smith ... 8
New Novels. By Gerald Gould ... 6

THEATRES:

Fifteen Printed Plays. By St. John Ervine ... 13
Drama's Personae ... 13

"THE PICTURES" ... 18

MUSIC OF THE WEEK:

The Spirit of Folk-song and Dance. By A. H. Fox-Strangways ... 12
ART AND ARTISTS. By P. G. Konody ... 12

THE WEEK END PAGES:

Competitions, Crosswords, Nature and Motor Articles, Auction Bridge, Acrostics, Chess, etc. ... 22, 23

LETTERS TO THE EDITOR ... 21
BROADCASTING ... 24
ESTATES AND HOUSES ... 24
THE COMING WEEK'S EVENTS ... 24
CHURCH SERVICES ... 24
CITY NEWS ... 2, 3
NEW YORK PRICES ... 3

****

pleasure. In fact, I rank sport, art, and science together. They are all forms of play."

"How do you arrive at that conclusion?"

"By realising that sport, art, science, are merely outlets for superfluous energy. We notice that when an animal is released to some extent from the struggle for existence, it begins to play. Thus domesticated animals, which depend on us for their food, use their superfluous energy in play. When man had to some extent conquered his environment, so that his whole life was no longer a struggle for bare existence, he began to play. He invented sports, he invented the arts, and he invented science. All these things are forms of play. They exist to give man pleasure."

IS INVENTION WORTH WHILE?

"But surely the pleasure given by science is experienced by very few people?"

"Yes, that is true. And it is customary to say that the importance of science for mankind in general is to be found in the practical applications of science. But I do not think that point of view is altogether correct. Undoubtedly some of the applications of science do lead to desirable results. For instance, I think it is a good thing that people should be enabled to see large parts of the earth. And I think that the facilities for transport and communication have a good side, inasmuch as they bring peoples closer together.

"But many of our modern achievements are of no real value at all. I recently spent some time in the heart of the country, remote from all modern conveniences. I did not find that the absence of these conveniences made me unhappy. I believe that we do not really want many of the things that science has given us. Fast motor-cars, the radio, and so on, are all things that we can do without perfectly well. The real fun of such things is in inventing them and making them work. It is the joy of construction and of solving a problem. It is a great pleasure to feel that we can actually dominate nature so far as to bring these extraordinary machines into existence. We gain a sense of power and have delight in our own ingenuity. But, having got the things, we do not really gain any benefits by using them. We use them simply because we have got them.

"Suppose, for instance, that we invent a ship that will go to America in twenty-four hours. We would be very pleased at having invented such a ship. The achievement would give us great pleasure. But who really wants to go to America in twenty-four hours? Merchants may imagine that they want to rush about the world at great speeds, but they are not a bit the happier for it. The so-called 'advances' of civilisation are not, to my mind, benefits at all, except for the intellectual pleasure they give."

CHESS AND SCIENCE.

"When you said just now that science is a game, a form of play, did you mean that it is a game in the sense that chess is a game? If so, how is it that science gives us information about reality, whereas chess does not?"

"Well, chess is a very limited game." Professor Schrödinger then proceeded to calculate the total number of combinations possible in chess. The result was curious and interesting, but would hardly enlighten the non-arithmetical reader. "Now in science," the Professor went on, "the number of combinations is infinite. It is not surprising that some of them should coincide with the way phenomena actually happen."

"I'm afraid the point is not yet clear to me," I replied. "I understand that somebody has invented a chess-board with more squares and pieces. This process could be continued. But, however long it went on, and however many games were played, no light would be thrown on the nature of reality."

The Professor smiled. "Yes, I'm afraid that science cannot be merely a game," he replied. "As a matter of fact, I think that the material universe and consciousness are made out of the same stuff. It is not, to me, a matter for great surprise that man should be able to find out the laws according to which nature works. We cannot speak of nature as something separate from mind. The nature we talk about is the nature that exists for our minds; we cannot possibly know of any other."

IS NATURE "IRRATIONAL"?

"Then what would you think of Eddington's remark that nature may finally turn out to be irrational?"

"That is altogether unthinkable," said Schrödinger with vivacity. "In fact," he said, smiling, "even if nature really *is* irrational, we could never, never believe it. Science cannot possibly be given up."

"Do you think that mankind has progressed?"

"I do not believe that the individual man has progressed morally. But I think that the mass moral consciousness is higher. Communities know more of one another; they are less isolated. And this leads to a greater mutual sympathy. Inter-community feeling is certainly less ruthless than it was, but the individual member of any community has not improved. On the other hand, there has been, I think, an intellectual development."

ARE WE THE ONLY LIFE?

"Do you think that life on this planet is a result of some sort of accident, or do you think it is part of some great scheme?"

"Life, as we know it, certainly seems to be dependent on rather special physical conditions. If one studies the

---

The Ladders.

The ladders of my heart go up to the sky,
To the very eaves of heaven, so high!
Swallows that are angels have made their nests up there,
And delicate swift wavers like rain-drops I hear.

I dare not climb the ladders beyond a little height,
My head turns giddy when the ground is out of sight,
And all the other builders pause as they pass to greet:
"Who sticks his ladder in the sky shall never build a house!"

Kind mockers, sweet neighbours, is there any understand?
No house am I a-building, save one in heart and hands;
I only climb the ladders with clear eyes and [illegible]

B. C. K. Enson.

***

Periodic Table of the Elements, for example, one finds that the element carbon seems to possess quite unusual properties. These properties are peculiarly fitted for building up organic bodies. Supposing carbon did not exist on this planet, would life be able to appear? It seems to be unlikely, although, of course, there may be forms of life of which we know nothing. But all life on this planet is dependent on carbon, and carbon alone seems to have just the extraordinary properties that are necessary.

"It might well be, therefore, that life is the result of an accident or coincidence. This planet happens to have had just the right chemical substance, and the right physical conditions of temperature and so on, to make life possible. But I do not think it at all likely that life is confined to this planet. To suppose so would seem to me against all the probabilities. On any scientific theory of the origin of planets there must be a large number of them scattered through the material universe. And the material substances with which we are familiar seem to be everywhere. Even on the doctrine of pure chance, therefore, I should consider it most unlikely that life exists only on this planet."

THE MYSTERY OF CONSCIOUSNESS

"But all activity in the universe must, it appears, some day come to an end. When that happens there will be no life anywhere in the universe. Will life then have been an episode of no permanent significance?"

"There can be no significance without life. Even if life here be the only life in the universe, then that life is the justification, the focus, of the whole thing."

"But if it comes to an end?"

"I am no more frightened by time than I am by space," said Schrodinger, smiling. "Life here is confined to a small space in the universe. It may also be confined to a small time. But if this life is the only life, then the whole meaning of the universe, throughout its extent and throughout its history, is to be found here. But although I think that life may be the result of an accident, I do not think that of consciousness. Consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental. It cannot be accounted for in terms of anything else."

(Copyright in Great Britain.)

<<TRANSCRIPTION>>

INTERVIEWS WITH GREAT SCIENTISTS.

IV.-PROF. SCHRÖDINGER.

SCIENCE AS A GAME.
THE FUN OF FINDING THINGS OUT.
FUTILE INVENTIONS.
“WHO WANTS” HIGHER SPEEDS?
LIFE THE KEY TO THE UNIVERSE.

We publish below the fourth of a series of interviews by Mr. J. W. N. Sullivan with leading men of science in this country and abroad.

The interviewer's aim has been directed less to the scientific achievement of these thinkers than to the philosophic attitude to which their work has brought them.

Interviews with Sir A. S. Eddington (December 21), Mr. H. G. Wells (December 28), and Sir J. H. Jeans (January 4) have already appeared.

(By J. W. N. Sullivan.)

Professor Schrödinger, one of the most brilliant of the younger school of physicists, has won his reputation chiefly by his work on the theory of the atom. His work well exemplifies the tendency of modern physics to become so abstract as to be entirely non-picturable. Schrödinger himself regards this tendency as a passing phase. He thinks that the new theories will ultimately assume a picturable form, and that science will once more become “intelligible” to the layman.

“I took up mathematics and physics quite early, as part of my ordinary school course,” said Professor Schrödinger. “I found that I liked these studies, and I conceived the project of going on to the technical high school in order to devote myself to the practical applications of science. But I found that I should have to learn geometrical drawing, and this prospect appalled me. So I went to the University instead, and concentrated on pure science. That really suited me much better, of course. But I must not give the impression that science alone interested me. As a matter of fact, my early desire was to be a poet. But I speedily realised that poetry was not a paying business. Science, on the other hand, offered me a career.”

“A FORM OF PLAY”

“What do you find to be, now, your chief interest in science?”

“The aesthetic interest. But science does not merely consist in composing beautiful theories. That would be too easy. The fact that theories have to fit the external world means that the aesthetic criterion alone is not sufficient. Science, really, is a game played according to certain rules.”

“What do you consider to be the chief importance of science to mankind?”

“Well, it so happens that I have just been writing about that very point. I have come to the conclusion that the chief function of science is to give pleasure. In fact, I rank sport, art, and science together. They are all forms of play.”

“How do you arrive at that conclusion?”

“By realising that sport, art, science, are merely outlets for superfluous energy. We notice that when an animal is released to some extent from the struggle for existence, it begins to play. Thus domesticated animals, which depend on us for their food, use their superfluous energy in play. When man had to some extent conquered his environment, so that his whole life was no longer a struggle for bare existence, he began to play. He invented sports, he invented the arts, and he invented science. All these things are forms of play. They exist to give man pleasure.”

IS INVENTION WORTH WHILE?

“But surely the pleasure given by science is experienced by very few people?”

“Yes, that is true. And it is customary to say that the importance of science for mankind in general is to be found in the practical applications of science. But I do not think that point of view is altogether correct. Undoubtedly some of the applications of science do lead to desirable results. For instance, I think it is a good thing that people should be enabled to see large parts of the earth. And I think that the facilities for transport and communication have a good side, inasmuch as they bring peoples closer together.

“But many of our modern achievements are of no real value at all. I recently spent some time in the heart of the country, remote from all modern conveniences. I did not find that the absence of these conveniences made me unhappy. I believe that we do not really want many of the things that science has given us. Fast motor-cars, the radio, and so on, are all things that we can do without perfectly well. The real fun of such things is in inventing them and making them work. It is the joy of construction and of solving a problem. It is a great pleasure to feel that we can actually dominate nature so far as to bring these extraordinary machines into existence. We gain a sense of power and have delight in our own ingenuity.

But, having got the things, we do not really gain any benefits by using them. We use them simply because we have got them.

“Suppose, for instance, that we invent a ship that will go to America in twenty-four hours. We would be very pleased at having invented such a ship. The achievement would give us great pleasure. But who really wants to go to America in twenty-four hours? Merchants may imagine that they want to rush about the world at great speeds, but they are not a bit the happier for it. The so-called 'advances' of civilization are not, to my mind, benefits at all, except for the intellectual pleasure they give.”

CHESS AND SCIENCE.

“When you said just now that science is a game, a form of play, did you mean that it is a game in the sense that chess is a game? If so, how is it that science gives us information about reality, whereas chess does not?”

“Well, chess is a very limited game.” Professor Schrödinger then proceeded to calculate the total number of combinations possible in chess. The result was curious and interesting, but would hardly enlighten the non-arithmetical reader. “Now in science,” the Professor went on, “the number of combinations is infinite. It is not surprising that some of them should coincide with the way phenomena actually happen.”

“I’m afraid the point is not yet clear to me,” I replied. “I understand that somebody has invented a chess-board with more squares and pieces. This process could be continued. But, however long it went on, and however many games were played, no light would be thrown on the nature of reality.”

The Professor smiled. “Yes, I’m afraid that science cannot be merely a game,” he replied. “As a matter of fact, I think that the material universe and consciousness are made out of the same stuff. It is not, to me, a matter for great surprise that man should be able to find out the laws according to which nature works. We cannot speak of nature as something separate from mind. The nature we talk about is the nature that exists for our minds: we cannot possibly know of any other.”

IS NATURE “IRRATIONAL”?

“Then what would you think of Eddington’s remark that nature may finally turn out to be irrational?”

“That is altogether unthinkable,” said Schrödinger with vivacity. “In fact,” he said, smiling, “even if nature really is irrational, we could never, never believe it. Science cannot possibly be given up.”

“Do you think that mankind has progressed?”

“I do not believe that the individual man has progressed morally. But I think that the mass moral consciousness is higher. Communities know more of one another; they are less isolated. And this leads to a greater mutual sympathy. Inter-community feeling is certainly less ruthless than it was, but the individual member of any community has not improved. On the other hand, there has been, I think, an intellectual development.”

ARE WE THE ONLY LIFE?

“Do you think that life on this planet is a result of some sort of accident, or do you think it is part of some great scheme?”

“Life, as we know it, certainly seems to be dependent on rather special physical conditions. If one studies the Periodic Table of the Elements, for example, one finds that the element carbon seems to possess quite unusual properties. These properties are peculiarly fitted for building up organic bodies. Supposing carbon did not exist on this planet, would life be able to appear? It seems to be unlikely, although, of course, there may be forms of life of which we know nothing. But all life on this planet is dependent on carbon, and carbon alone seems to have just the extraordinary properties that are necessary.

“It might well be, therefore, that life is the result of an accident or coincidence. This planet happens to have had just the right chemical substance, and the right physical conditions of temperature and so on, to make life possible. But I do not think it at all likely that life is confined to this planet. To suppose so would seem to me against all the probabilities. On any scientific theory of the origin of planets there must be a large number of them scattered through the material universe. And the material substances with which we are familiar seem to be everywhere. Even on the doctrine of pure chance, therefore, I should consider it most unlikely that life exists only on this planet.”

THE MYSTERY OF CONSCIOUSNESS

“But all activity in the universe must, it appears, some day come to an end. When that happens there will be no life anywhere in the universe. Will life then have been an episode of no permanent significance?”

“There can be no significance without life. Even if life here be the only life in the universe, then that life is the justification, the focus, of the whole thing.”

“But if it comes to an end?”

“I am no more frightened by time than I am by space,” said Schrödinger, smiling. “Life here is confined to a small space in the universe, it may also be confined to a small time. But if

this life is the only life, then the whole meaning of the universe, throughout its extent and throughout its history, is to be found here. But although I think that life may be the result of an accident, I do not think that of consciousness. Consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental. It cannot be accounted for in terms of anything else."

(Copyright in Great Britain.)

<< end of transcription >>

SOURCES:

- Interview with Erwin Schrödinger 1/3: https://web.archive.org/web/20250826211101/https://www.newspapers.com/article/the-observer-interview-with-erwin-schrd/155804857
- Interview with Erwin Schrödinger 2/3: https://web.archive.org/web/20250815180918/https://www.newspapers.com/article/the-observer-interview-with-erwin-schrd/155804990
- Interview with Schrödinger 3/3: https://web.archive.org/web/20250818111645/https://www.newspapers.com/article/the-observer-interview-with-schrdinger/155805838/

SERIES:

Interviews with great scientists, by J. W. N. Sullivan – The Observer, London, 1930/31

1. Arthur Eddington – 21 Dec 1930
2. H. G. Wells – 28 Dec 1930
3. James Hopwood Jeans – 4 Jan 1931
4. Erwin Schrödinger – 11 Jan 1931
5. Josiah Stamp – 18 Jan 1931
6. Max Planck – 25 Jan 1931